

# Developing 4c's Instruments In Line With E-Learning Based Independent Learning Activity Unit

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**Abstract**—Rapid technological development is the mark of the 21st century, competent young people are needed to face changing times. The 4C's (Collaboration, Communication, Critical thinking, Creativity) are skills young people need to be able to face the rapid development of this era. So far there are no 4C's instruments available for e-learning based Independent Learning Activity Unit (UKBM: Unit Kegiatan Belajar Mandiri). Therefore, the objective of this study is to produce 4C's instruments for an e-learning-based UKBM that are valid and reliable. This research and development study consists of 8 steps. The study was conducted on high school students in the Sumenep Regency who were studying with the Semester Credit System. Data collection techniques included questionnaires, observations, and interviews. Data analysis were in the form of validity (for content and construct) and reliability tests. A reliability test was done by calculating the alpha Cronbach value. The results of the study are the creation of valid and reliable synergy assessment instruments. The overall content validity of the criteria is very good and quite good. The results of the factor analysis show that all questionnaire items meet construct validity. The Alpha Cronbach value of the questionnaire was 0.680 with the medium category.

**Keywords:** Independent Learning Activity Unit, Semester Credit System, 4C's

## I. INTRODUCTION

Sumenep Regency is one of the districts that has a learning system with Semester Credit System (SKS: Sistem Kredit Semester) at the high school level. The Minister of Education and Culture Regulation No. 158/2014 concerning the Implementation of Semester Credit Systems in Primary and Secondary Education in

Article 4 states that learning with credit is managed in the form of differentiated learning for each group of students with different learning speeds. For this reason, there must be a diversification of learning services in the SKS implementation. The whole learning service refers to the concept of complete learning (mastery learning), which is a learning strategy that employs the principle of completeness individually and which requires students to thoroughly master all Core Competencies and Basic Competencies for every subjects. Such learning provides different opportunities and quality of teaching to students.

SKS learning must be equipped with the skills needed in the 21st century. The skills needed in dealing with very rapid technological changes are 4C's skills [1], [2]. 4C's skills applied in learning can improve speed in solving problems [3].

Communication is not just a speaking skill, the meaning of communication has changed with the increasingly rapid technological changes [4]. Communication is a skill needed in the 21st century [5]. We are witnessing changes in communication patterns when technology holds full control in the individual's life. In fact, individuals are the ones who should control technology. Today, students are more active in social media than in discussing face-to-face [6]. Such behavior causes students to be insensitive, not care to about the surroundings, and to have a higher attitude of individuality. This causes students' to have poor communication skills. Therefore, communication skills are currently developed using technology tools or media [4]. Collaboration is also one of the skills needed in the 21st century. Learning

that emphasizes collaboration skills enables students to establish good cooperation and be able to solve problems well [7]. The ability to solve problems is closely related to students' thinking processes. One of the thinking skills is critical thinking[8].

Critical thinking is a process that facilitates students' ability to gain new knowledge through problem solving and collaboration [7]. Critical thinking focuses on the learning process rather than merely acquiring information [9]. This skill involves how to research, summarize, make decision, and create and apply new knowledge to real-world situations that will help students gain optimal development [10].

The optimal development of students' creative skills in the learning environment is closely related to the teacher's method [11]. Teachers must have the ability to use the latest technology as a learning medium so students become creative [10].

Based on the description above, the e-learning based UKBM learning that is implemented in schools is expected to grow and develop 4C's skills, so that the skills needed in the 21st century are formed. This research is expected to assist teachers in developing 4C's skills, so teachers can measure 4C's skills in the learning process. This study aims to measure the validity and reliability of the developed 4C's instruments.

## II. METHOD

This is a Research and Development study which consists of 8 steps, namely (1) determining instrument specifications, (2) writing instruments, (3) determining a measurement scale, (4) determining a scoring system, (5) analyzing instruments, (6) conducting trials, (7) analyzing instruments and (8) assembling instruments. This research was conducted at the senior high school in Sumenep Regency. The study population were students from senior high school that implemented the Semester Credit System in Sumenep Regency. The study sample was 300 students spread across Sumenep Regency. Data collection methods were questionnaires, observations, and interviews.

Data analyseis were validation and reliability tests. Validity tests on all instruments included content validity and construct validity. Content validation was done by making an instrument grid

developed from in-depth theoretical studies, then the instrument grid was developed into an indicator. The validity of the construct was conducted by asking an expert judgment to give input to the instruments prepared. Specifically on the questionnaire instrument, the validation test was continued with empirical validation by testing them on the sample, namely high school students of class X who carried out learning using e-learning UKBM in Sumenep Regency. Analysis of the empirical validation test was obtained by factor analysis techniques to see how much the correlation was among factors that form the variable. If a strong correlation was found between the forming factors, the factor was then stated as a variable constructor. The reliability test was only done on questionnaire items that had fulfilled the validation aspect. Reliability was seen from the alpha Cronbach value.

## III. RESULTS AND DISCUSSION

Following are the research steps that were carried out.

### 1. Determining Instrument specification

The objective of this study is to produce 4C's instruments. The research was conducted on relevant theories and literature and then 4C's instruments in comprehensive UKBM learning, which meant it included family, school and community environments, was compiled. The following 4C's instruments in learning have been developed.

Table 1. 4C's Skill Instruments

Research Variable	Technique	Instrument	Data Source
<i>Students' 4C's Skills</i>	Interview	Interview guidelines	Students
	questionnaire	Questionnaire sheet	Students
	Observation	Observation sheet	Observer

### 2. Writing Instruments

4C's skills are the basic skills needed in the 21st century, they are Communication, Collaboration, Critical Thinking and Creativity. Each component is translated into several subcomponents. Subcomponents are determined based on the study of relevant theories and literature. Formulation of

subcomponents will determine the instrument indicators.

Each indicator is then described in each instrument item to be used. The instruments used are (1) observation sheets, (2) questionnaires, and (3) interview guideline sheets. The observation sheet is used to observe students' 4C's skills based on learning activities with e-learning UKBM. The interview guideline contains a series of questions about student's synergy work. Interviews are conducted with students and teachers to triangulate data

**3. Determining Measurement Scale**

The questionnaire items were arranged using a Likert scale. The observation sheet is arranged using a scale based on the prepared rubric.

**4. Determining scoring system**

Questionnaire sheets are prepared using a 4 point Likert scales, namely 1 = disagree, 2 = doubt, 3 = agree, 4 = very much agree. The observation sheets are arranged using a 1-4 scale with reference to the compiled rubric. The more activities the respondent undertakes that lead to the achievement of 4C's skills, the closer the scores obtained are to 4.

**5. Analyzing instruments**

Analyzing the instrument is researching about: 1) whether the questions or statements are in accordance with the indicators, 2) whether the language used is communicative and in correct grammar, 3) whether the questions or statements are unbiased, 4) whether the instrument format is interesting, 5) whether the number of items is correct so it is not boring to answer.

The study was conducted by 8 lecturers who have expertise in the field of science learning. The results of this study were then used to improve the instrument.

**Table 2. Instrument Validation Score Conversion**

Observed aspect	Score Ranger	Score	Category
Contents	X >	A	Very
	4.20	B	Good
	3.40 <	C	Good
	X ≤	D	Passable
	4.20	E	Not
	2.60 <		Good
	X ≤		Very Bad
	3.40		
	1.80 <		
	X ≤		
2.60			
X ≤			

	1.80		
Language	X >	A	Very
	4.20	B	Good
	3.40 <	C	Good
	X ≤	D	Passable
	4.20	E	Not
	2.60 <		Good
	X ≤		Very Bad
	3.40		
	1.80 <		
	X ≤		
2.60			
X ≤			
1.80			
Construction	X >	A	Very
	4.20	B	Good
	3.40 <	C	Good
	X ≤	D	Passable
	4.20	E	Not
	2.60 <		Good
	X ≤		Very Bad
	3.40		
	1.80 <		
	X ≤		
2.60			
X ≤			
1.80			

**a. Questionnaire**

Data from the 4C's instrument validation are in the form of scores to be converted to a five point-scale. Data from expert validation can be seen in the following table.

**Table 3. Expert Validation Result for 4C's Questionnaire**

Observed Aspect	Average Score	Score	Category
Contents	2,43	B	Good
Language	3,52	B	Good
Construction	4,3	A	Very Good

**b. Observation Sheet**

The observation sheet is used to measure 4C's in e-learning UKBM learning conducted by students in the class. Assessment includes 3 aspects, namely contents, language, and construction. Data from the validation results for each aspect in the form of a score are then converted to five-point scale.

**Table 4. Expert Validation Result for 4C's Observation Sheet**

Observed Aspect	Average Score	Score	Category
Contents	4.33	A	Very

			Good
Language	4.50	A	Very Good
Construction	4.33	A	Very Good

c. Interview Guidelines sheet

The interview guidelines sheet served as additional data to determine each student's synergy work. This assessment includes 3 aspects, namely contents, language, and construction. Data from the validation results for each aspect in the form of a score are then converted to five-point scale.

Table 5. Expert Validation Result for 4C's Interview Sheet

Observed Aspect	Average Score	Score	Category
Contents	2.67	C	Passable
Language	4.50	A	Very Good
Construction	4.50	A	Very Good

Based on Table 5, it can be seen that the validation results by all experts indicate that the interview guideline sheet is very good, except for the contents aspect which was ranked passable. Therefore before the interview guideline sheet is used to measure synergy work, the instrument's contents should be improved based on the expert's advice.

6. Conducting Trials

The instrument trial was conducted on 300 high school students who are involved in e-learning UKBM in Sumenep Regency. The trial aimed to determine construct validity and instrument reliability using SPSS software.

7. Analyzing Instrument

Based on the factor analysis, data showed that all 4C items are declared valid. In addition, factor analysis with the explanatory methods was successful using factor analysis in SPSS 25 for Windows software. Based on the analysis requirements test with Kaiser Meyer Olkin regarding the measure of sampling adequacy KMO MSA the value of 0.909 was obtained. So, overall, the data could be said to be good because it had a measure of sampling adequacy value KMO MSA greater than 0.5. Therefore, factor analysis could be conducted. As seen from the anti-image correlation (AIC) table, there was no value below 0.5. Thus, the process could proceed. Based on the above

analysis, it could be concluded that the scale in the synergy work aspects that were compiled reached a valid aspect in terms of the construct validity. The synergy work reliability test showed that the synergy work coefficient was 0.680 and it was in the criteria of medium. Because this questionnaire item was not used to make estimates, the reliability values that were in the medium criteria were sufficient enough to measure synergy work at the stage of data collection in the field.

Table 6. KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	0.909
Bartlett's Test of Sphericity	2814, 65
Approx. Chi-Square	465
df	
Sig.	.000

8. Assembling Instrument

Based on the instrument analysis, the 4C's instrument in the form of a questionnaire did not need any change. The 4C's assessment instrument in the form of a 4C's questionnaire consists of 30 items. The content of the interview guideline sheet was changed according to input from expert advice.

The 4C's instrument development was also been developed with valid and reliable results on Mathematics subjects[12]. This research uses different methods and objectives. This research refers to e-learning UKBM in schools that practice credit system in their learning.

IV. CONCLUSION

The study results show that the developed 4C's instruments meet validity and reliability aspects. The validity of the questionnaire contents are all very good criteria. The factor analysis results on the questionnaire showed that all questionnaire items met construct validity. The questionnaire Alpha Cronbach value was 0.680 with the medium category. The observation sheet was declared valid with very good criteria. The interview guideline was declared valid with very good criteria except the contents aspect which was in passable criteria.

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